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EVALUATION OF THE ARMY FIXED-WING
APTITUDE BATTERY IN SELECTION
FOR ROTC FLIGHT TRAINING

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Harry Kaplan

Approved by:

J. E. Uhlaner, Director
U. S. Army Behavioral Science
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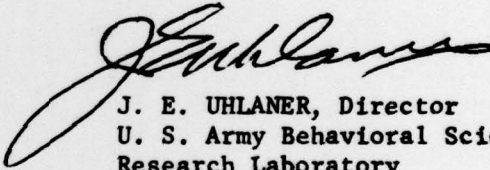
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Research studies are special reports to military management. They are usually prepared to meet requests for research results bearing on specific management problems. A limited distribution is made--primarily to the operating agencies directly involved.

FOREWORD

Beginning in 1955, the Deputy Chief of Staff for Personnel established requirements for the development of instruments to select officers as fixed-wing pilot trainees and enlisted men as Warrant Officer candidate rotary-wing pilot trainees. With the introduction of the ROTC Flight Instruction Program in 1956, an additional requirement was established for development of a test battery to be used in selecting trainees for this program from among ROTC students who applied for training.

The Army Fixed-Wing Aptitude Battery (AFWAB-1), adopted for Active Army use in 1956, was tried out experimentally in the ROTC program, and in 1961 was implemented for operational use in the program. By 1966, questions had arisen concerning the current effectiveness of AFWAB-1 and the appropriateness of the cutting score. To provide answers to these questions, the present study was conducted at the request of the ROTC Branch, DCSPER.



J. E. UHLANER, Director
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EVALUATION OF THE ARMY FIXED-WING APTITUDE BATTERY IN SELECTION FOR ROTC FLIGHT TRAINING

BRIEF

Requirement:

To conduct a follow-up study of the effectiveness of the Army Fixed-Wing Aptitude Battery, AFWAB-1 and the appropriateness of the present qualifying score in selecting trainees for the ROTC Flight Instruction Program.

Procedure:

AFWAB-1 results for students tested during 1966 and 1967 were collected from institutions participating in the ROTC Flight Instruction Program, together with data on pass-fail, acceptance for flight training, and performance in flight training. Statistics were compiled on the effect of the present qualifying score on numbers accepted and on numbers successfully completing the course.

Findings:

Present rate of rejection for flight training on the basis of aptitude test scores is low (about 13%), and rate of successful completion of the course is high (about 85%).

If desired, loss of trainee input through rejection by reason of relatively low test scores can be minimized by lowering the qualifying score or by granting waivers administratively.

Of 568 students who completed training, 36 received a delay in reporting for active duty to work toward completion of an additional academic degree.

Utilization of Findings:

Research findings were furnished the ROTC Branch, DCSPER as a basis for decisions on operational policy with respect to continued use of AFWAB-1, retention of present cutting score, and practice of delaying assigning successful trainees to the active Army so that they can continue academic study.

EVALUATION OF THE ARMY FIXED-WING APTITUDE BATTERY, AFWAB-1 IN SELECTION FOR ROTC FLIGHT TRAINING

OBJECTIVE

↙ The Army ROTC Flight Instruction Program was authorized by regulation in 1956 in order to provide basic ground and in-flight fundamentals to meet minimum requirements of the Federal Aviation Agency (FAA) and to qualify students for FAA private pilot certification. The objective was to create a reserve pool of qualified pilots who can be utilized in the event of a national emergency. ROTC flight training may further serve as a selection device and as useful preparation for the Active Army's flight training programs.

Upon the implementation of this program, a need existed for a test battery to be used in selecting trainees for the ROTC Flight Instruction Program from among ROTC students who applied for training and who met the general standards for acceptance. ↘ The Army Fixed-Wing Aptitude Battery, AFWAB-1, was administered experimentally to samples of students applying for ROTC flight instruction during the years 1956-57, 1957-58, and 1958-59. The battery was then evaluated for effectiveness in discriminating between successful and unsuccessful trainees. On the basis of this research, AFWAB-1 was adopted for ROTC use in 1961.

By 1966, questions had arisen concerning the current effectiveness of AFWAB-1 and the appropriateness of the cutting score. To provide answers to these questions, the present study was conducted at the request of the ROTC Branch, DCSPER. Specific objectives of the follow-up were:

1. To determine what proportion of applicants fail to attain a qualifying score on AFWAB-1.
2. To evaluate the current effectiveness of AFWAB-1 in predicting success in the ROTC Flight Instruction Program.
3. To determine what proportion of the students completing flight training receive a delay in reporting for active duty for the purpose of obtaining an additional academic degree.

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¹ Rosenberg, Nathan, Donald M. Skordahl, and Harry Kaplan. Validation of Army Fixed-Wing Aptitude Battery against success in ROTC flight training. BESRL Technical Research Note 111. May 1961.

METHOD

Data collection was accomplished with the cooperation of USCONARC which distributed a data collection form (USAPRO Form 92) to ROTC institutions participating in the ROTC Flight Instruction Program. Each institution was requested to provide the following information on each student tested with AFWAB-1 for entrance into flight training during the school year 1966-67.

1. Name of Student.
2. AFWAB-1 Composite Score.
3. Was student accepted for flight training?
4. If student was not accepted, give reason for nonacceptance.
5. Did student complete flight training?
6. Did student receive a delay in reporting for active duty for the purpose of obtaining an additional degree?

RESULTS

Complete data were obtained for 115 schools. In these schools, AFWAB-1 scores were reported for 1,280 students. Of these, 167 or 13% failed to attain a passing score of 35 on the test battery. Of the 167 test failures, 17 students were accepted for training for a variety of reasons leaving a total of 150 test failures rejected for training. The number of students who were accepted for training and who actually entered training was 688 or 54% of the 1,280 students who took the test battery.

The number of students who did not enter training and the reason such non-entrance are given in the following breakdown:

<u>REASON</u>	<u>N</u>
Failure on AFWAB-1	150
Failure to pass physical examination	212
Declined to enter training	124
Left school	30
Academic deficiency	19
Did not take flight physical	21
Quota limitations	11
No reasons given	10
Miscellaneous reasons	15
	<u>592</u>

Of the 688 students who entered training, 586 completed the program, and 102 or 15% did not complete the program. Among the 17 students who failed to meet the cutting score on the selection test battery, 35% did not complete the program. If none of these students had been admitted to training, the overall attrition rate in training would have been 14% instead of the 15% which actually occurred. If all the students (150) who were rejected for training because of low test scores had been admitted to training, the overall success rate in training would have been reduced from 85% to 82%. Thus 82% of the students entering training would complete the program if no selection test were used, whereas with the use of AFWAB-1, 85% of the students entering training complete the program.

Of the 586 students who completed training, 36 received a delay in reporting for active duty for the purpose of obtaining an additional academic degree and 516 students did not receive a delay. Disposition of the remaining 34 students was unknown or uncertain. If we exclude these 34 students from consideration, it is estimated that 7% of the students completing training received a delay.

CONSIDERATIONS REGARDING THE QUALIFYING SCORE

Establishment of a particular qualifying score on a selection test is based on the desire to find an optimal point which will assure an adequate supply of personnel to training and at the same time avoid an excessive failure rate in training. If the selection test has validity, raising the qualifying score will reduce the failure rate in training; but it may also result in reducing the number of people available for training to a point where operational requirements for manpower may not be met. Lowering the qualifying score could result in an adequate number of personnel to meet operational requirements, but it will do so at the cost of a higher failure rate in training. The 13% rejection rate on the test and the 15% failure rate in training which results from the present qualifying score of 35 do not appear to be excessive. However, in case changing conditions of supply and demand for candidates require an adjustment, the following table shows what percent of candidates would be expected to be rejected at given cutting scores from 20 to 55.

<u>AFWAB-1 Cutting Score</u>	<u>Percent of Applicants Rejected</u>
55	52%
50	40%
45	31%
40	21%
35	13%
30	9%
25	5%
20	2%

If the present selection test were eliminated altogether, the failure rate in training would be increased by 3%, but as many as 2/3 of the students now rejected by the test could complete training successfully. However, the actual number of students gained for flight training would be considerably less due to failure of students to meet physical standards, rejections for nontest reasons, declinations and number of applicants in excess of quotas. A conservative solution to this conflict might be to retain the selection test but to grant individual waivers at those institutions where rigid adherence to the qualifying score would endanger the training program.

QUESTION OF REPLACING AFWAB-1

An alternative to the above procedure would be to replace the present selection battery with a more valid test. To assure greater validity would require an expensive research effort including the use of student time for experimental testing. While such an effort would reduce somewhat the failure rate in training, the increase in selective efficiency would be small. Manpower requirements would probably preclude any large increase in the present rejection rate of 13% on the selection test. If it is also true that 82% of the applicants could complete the training without a selection test, even a test of extremely high validity is unlikely to increase the number of students who complete training more than 5% above the 82%. Since the present test is operating fairly close to this limit, an extensive research effort on a replacement test does not appear warranted. In situations of this nature, BESRL sometimes makes editorial revisions in which obsolete content is deleted, appearance is improved, and administrative and scoring procedures are made consistent with current practices.

It has been suggested that the selection battery for the Active Army flight training programs replace the AFWAB-1. During the period 1961-1966, procedures for selecting trainees for Army helicopter and fixed-wing aircraft operation underwent several modifications based on BESRL research.² In 1966, a comprehensive set of Flight Aptitude Selection Tests (FAST) was implemented for Active Army use. These tests provide effective measurement of both fixed-wing and rotary-wing aptitude of applicants for Army aviation training.

While the advantages of using the FAST battery in the ROTC are obvious, there appear to be enough serious disadvantages to warrant rejection of the suggestion at the present time.

1. If the FAST-OB were to be used, testing time per examinee would be increased from about 2-1/2 hours to about 4 hours.

² Harry Kaplan. Prediction of success in Army aviation training. BESRL Technical Research Report 1142. June 1965.

2. Since there is no alternate form of the FAST-OB, any use of the test which would jeopardize its security is highly undesirable. It is felt that the widespread distribution of these materials to colleges and universities would shorten the useful life of the battery. In the event of test compromise, there would be no alternate form to fall back on.
3. The fact that retest with the FAST-OB is not authorized would create a host of administrative difficulties with the ROTC population. Almost half of the students who take the selection battery do not enter the flight instruction program. The majority of these students are rejected or decline for nontest reasons. If the FAST-OB were administered at the ROTC institutions, transfer of test scores to Active Army records would have to be accomplished. It can safely be predicted that this transfer process would not always be accomplished. Officers who take the battery while in ROTC training and who subsequently apply for flight training while in the Active Army are likely to become involved in a great deal of correspondence with a consequent increase in administrative burden to the Army. The use of AFWAB-1 (or a replacement) in ROTC with no transfer of records required would prevent this administrative burden.

DELAY IN ASSIGNING FLIGHT TRAINING ELIGIBLES

It is estimated that 7% of the students who complete flight training receive a delay in reporting for active duty so that they may work toward an additional academic degree and that such delays are limited to 25% of the schools.

CONCLUSIONS

Under present conditions, the rate of rejection for training due to selection test scores is rather low and the success rate in training, even if a selection test were not used, would be very high. Consequently, even a highly valid selection test would result in only a marginal reduction in training rate attrition. On the other hand, a selection test of any degree of validity has the effect of reducing the failure rate in training. Furthermore, the selective efficiency of a test would increase if the excess of applicants over the number of persons accepted for training increased, and/or if the success rate in training without a test decreased. But, even under present unfavorable conditions, loss of manpower due to rejection because of low test scores can be minimized by lowering the qualifying score or by granting waivers where they appear justified. The final judgment which must be made is to determine whether the cost of testing is worth bearing for whatever minimal value it has at present or as a hedge against future changes in the supply and general quality of available manpower.